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(54) **SERVER AND METHOD FOR PROVIDING MOBILE WEB SERVICE**

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H04L 29/08 (2006.01)

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CPC ***H04L 47/70*** (2013.01); ***H04L 67/2861*** (2013.01); *H04L 67/02* (2013.01)

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CPC G06F 15/173
USPC 709/225, 239; 455/426.1
See application file for complete search history.

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(57) **ABSTRACT**

A server for a mobile web service and a method for providing a web service are provided. The wired server stores an IP address of at least one mobile web server. When a request for access to a mobile web server is received, the wired server delivers the access request to the mobile web server or provides a service in place of the mobile web server, using a URL included in the access request.

14 Claims, 5 Drawing Sheets

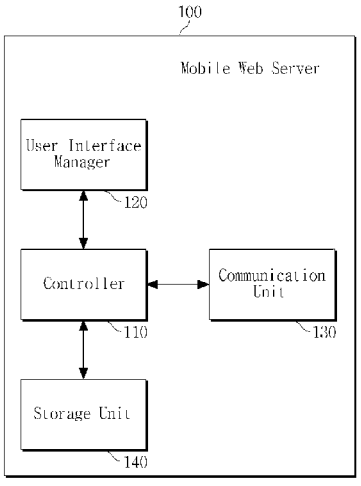


FIG.1

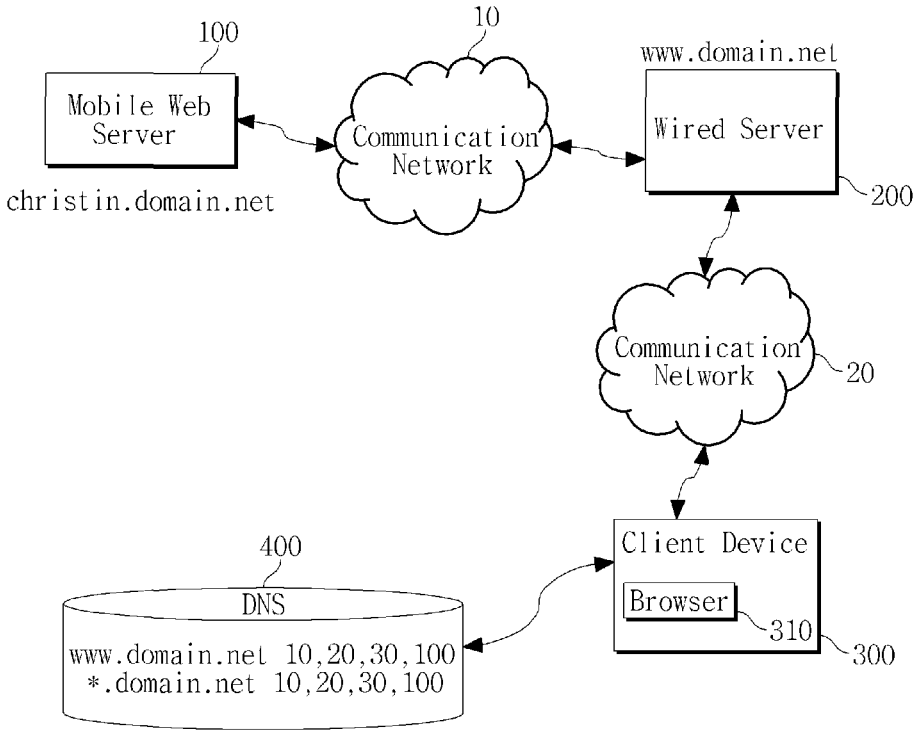

100
Mobile Web Server
christin.domain.net
10
Communication Network
www.domain.net
Wired Server
200
Communication Network
20
400
DNS
www.domain.net 10,20,30,100
*.domain.net 10,20,30,100
Client Device
Browser
310
300

FIG.2

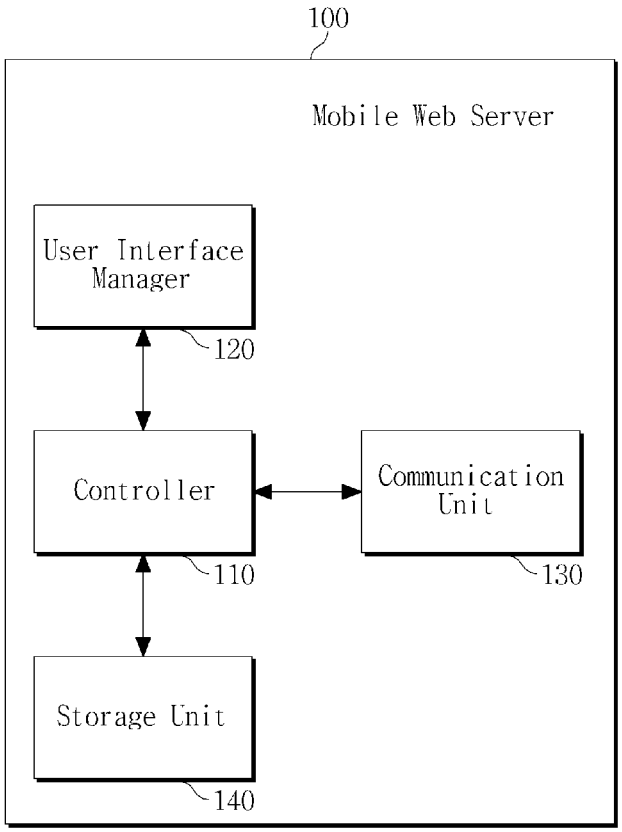

100
Mobile Web Server
User Interface Manager
120
Controller
110
Communication Unit
130
Storage Unit
140

FIG.3

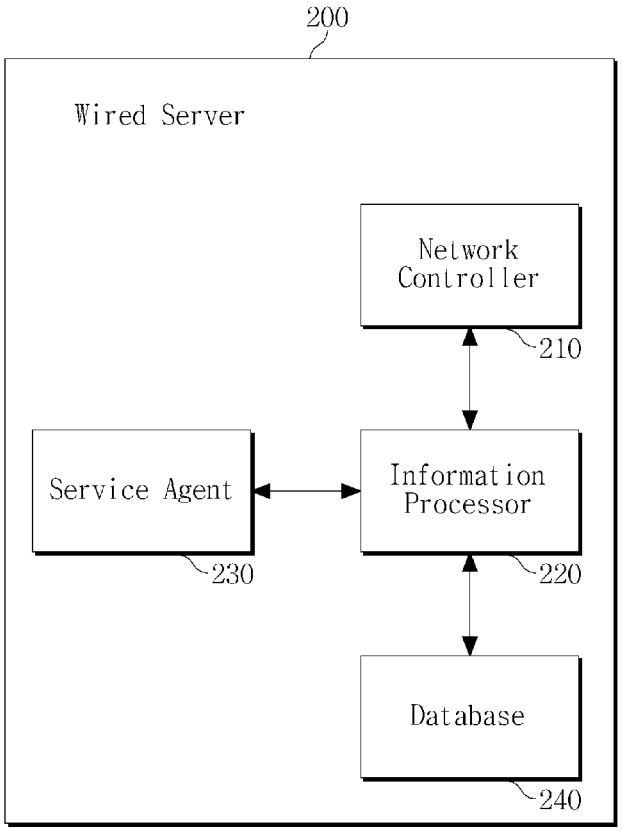

200
Wired Server
Network Controller
210
Service Agent
Information Processor
230
220
Database
240

FIG.4

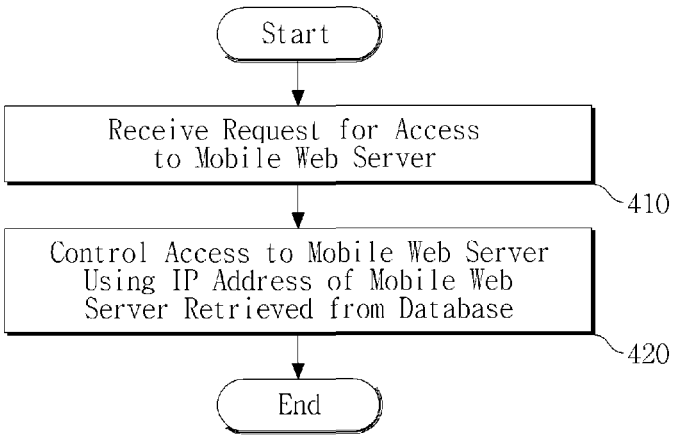
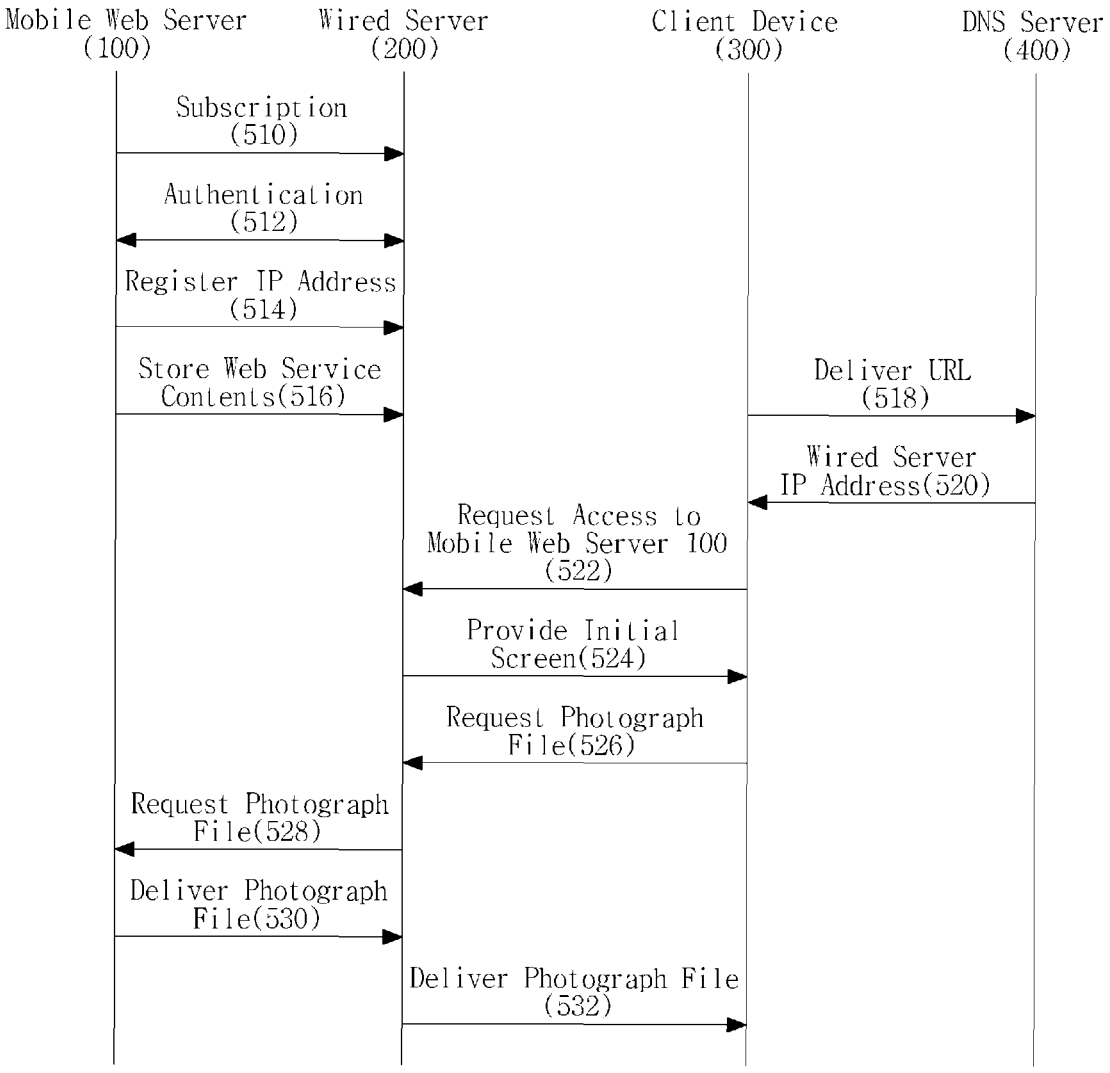

Start
Receive Request for Access to Mobile Web Server
410
Control Access to Mobile Web Server Using IP Address of Mobile Web Server Retrieved from Database
420
End

FIG.5


Mobile Web Server (100)
Wired Server (200)
Client Device (300)
DNS Server (400)
Subscription (510)
Authentication (512)
Register IP Address (514)
Store Web Service Contents(516)
Deliver URL (518)
Wired Server IP Address(520)
Request Access to Mobile Web Server 100 (522)
Provide Initial Screen(524)
Request Photograph File(526)
Request Photograph File(528)
Deliver Photograph File(530)
Deliver Photograph File (532)

SERVER AND METHOD FOR PROVIDING MOBILE WEB SERVICE

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application is a continuation application of U.S. patent application Ser. No. 12/546,720, filed Aug. 25, 2009, now U.S. Pat. No. 8,352,580, issued on Jan. 8, 2013, which claims the benefit under 35 USC §119(a) of Korean Patent Application Nos. 10-2008-116427, filed on Nov. 21, 2008, and 10-2009-24522, filed on Mar. 23, 2009, the entire disclosures of each of which are incorporated herein by reference for all purposes.

BACKGROUND

1. Field

The following description relates to a system to provide a web service, and more particularly, to a system that uses a mobile web server to provide a mobile web service.

2. Description of the Related Art

Mobile phones have been evolving and are recognized as one of the most important devices in an individual's life. Mobile phones enrich life in ways that go beyond its basic function of enabling telecommunication. Benefiting from digital convergence, visual records of day-to-day life can be created using a camera function of a mobile phone. The mobile phone can be further equipped to assist other aspects of a person's daily life, including managing one's schedule and acquaintance, keeping personal memos, playing games, listening/watching music/movies, making purchases, and the like.

Moreover, a mobile phone has been recently utilized as a user-created content (UCC) authoring tool. The mobile phone has been widely utilized as a publishing tool, such as by directly uploading contents created by the mobile phone onto the Internet and sharing the contents with other people. Since the mobile phone is made to be portable, it typically has limitations with regard to usability and performance. For example, it is inconvenient to use a mobile phone to interwork with and share contents via Internet service tailored to personal computers (PCs) as basic clients. Accordingly, contents created or stored in a mobile phone are normally uploaded to a web server which is then accessed by other clients to share the contents.

A way is being sought to directly access contents created or stored by a terminal using a mobile phone as a web server, through an external web browser. In a method by which a client directly accesses a mobile phone, a user providing contents using the mobile phone may only create or store contents and may not upload or transmit additional contents. However, when all processes are performed by the mobile server in response to a request from an external client, a large amount of the terminal's resources are consumed, and it is difficult to provide full service due to limited performance of the terminal. Also, when the mobile server cannot be accessed, for example, when the terminal functioning as the mobile server is powered off or is busy, service cannot be provided to an external client.

SUMMARY

According to one general aspect, there is provided a wired server for a mobile web service, including a database configured to store an IP address of at least one mobile web server, and a network controller configured to control access to a mobile web server using an IP address of the mobile web server retrieved from the database in response to a request for access to the mobile web server.

The request for access to the mobile web server may include a URL indicating a location of content for web service provided by the mobile web server.

The wired server may further include a service agent configured to provide a service provided by the mobile web server in place of the mobile web server, wherein in response to the request for access to the mobile web server being a request for access to the service provided by the service agent, the network controller controls the service agent to handle the request.

The network controller may determine whether a web service that can be provided by the service agent in place of the mobile web server is requested, using a URL indicating a location of content for web service provided by the mobile web server, the URL being included in the request for access to the mobile web server.

The network controller may use a URL of a new mobile web server to register the new mobile web server.

The network controller may perform a login task using the URL of the new mobile web server as an ID of the new mobile web server.

The network controller may filter the request for access to the mobile web server to restrict the request for access to the mobile web server.

According to another general aspect, there is provided a method of operating a wired server to provide a mobile web service, the method including receiving a request for access to a mobile web server, and controlling access to the mobile web server using an IP address of the mobile web server retrieved from a database accessible by the wired server.

The request for access to the mobile web server may include a URL indicating a location of content for web service provided by the mobile web server.

The method may further include providing a service provided by the mobile web server in place of the mobile web server by the wired server.

The method may further include determining whether a web service that can be provided in place of the mobile web server is requested, using a URL indicating a location of content for web service provided by the mobile web server, the URL being included in the request for access to the mobile web server.

The method may further include registering a new mobile web server using a URL of the new mobile web server. A login task may be performed using the URL of the new mobile web server as an ID of the new mobile web server.

The method may further include filtering the request for access to the mobile web server to restrict the request for access to the mobile web server.

According to still another general aspect, there is provided a mobile web server for a mobile web service, including a user interface manager configured to provide a user interface with a user of the mobile web server, a storage unit configured to store content for web service, a communication unit configured to communicate with a wired server to register an IP address of the mobile web server in the wired server, and a controller configured to control the communication unit and control an operation of the mobile web server.

The communication unit may communicate with the wired server to register a URL of the mobile web server and use the URL as a user ID.

The communication unit may communicate with the wired server to deliver content that the wired server can provide in place of the mobile web server.

The mobile web server may be one of a portable phone, a personal digital assistant (PDA), a portable multimedia player device, a portable game console, and a portable camera device.

Other features and aspects will be apparent from the following detailed description, the drawings, and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram illustrating an exemplary network environment in which a mobile web server is accessed using a wired server for a mobile web service.

FIG. **2** is a block diagram illustrating an exemplary mobile web server.

FIG. **3** is a block diagram illustrating an exemplary wired server to provide a mobile web service.

FIG. **4** is a flowchart illustrating an exemplary method of a wired server to provide a mobile web service.

FIG. **5** is a diagram illustrating an exemplary method of providing a mobile web service using a wired server and a mobile web server.

Throughout the drawings and the detailed description, unless otherwise described, the same drawing reference numerals will be understood to refer to the same elements, features, and structures. The relative size and depiction of these elements may be exaggerated for clarity, illustration, and convenience.

DETAILED DESCRIPTION

The following detailed description is provided to assist the reader in gaining a comprehensive understanding of the methods, apparatuses, and/or systems described herein. Accordingly, various changes, modifications, and equivalents of the systems, apparatuses and/or methods described herein will be suggested to those of ordinary skill in the art. Also, descriptions of well-known functions and constructions may be omitted for increased clarity and conciseness.

FIG. **1** illustrates an exemplary network environment in which a mobile web server **100** is accessed using a wired server **200** for a mobile web service.

Referring to FIG. **1**, the wired server **200** for a mobile web service (hereinafter, referred to as a wired server) is connected to the mobile web server **100** and a client device **300** via communication network(s). Communication between the mobile web server **100** and the wired server **200**, and communication between the wired server **200** and the client device **300**, may be based on a communication protocol such as hyper text transport protocol (HTTP). The mobile web server **100** may be a portable terminal capable of performing network communication, such as a portable phone, a personal digital assistant (PDA) and the like. The client device **300** may be a portable terminal similar to the mobile web server **100**, or may be a stationary computing device such as a desktop computer.

The exemplary wired server **200** stores an IP address of at least one mobile web server. The wired server **200** may store IP addresses of a plurality of mobile web servers that have registered uniform resource locators (URLs) in the wired server **200**, including the mobile web server **100**, and completed a subscription procedure.

When a request for access to a mobile web server is received, the wired server **200** controls access to the mobile web server using the stored IP address. As an example, the wired server **200** may deliver some of the service requests to the mobile web server **100**, and directly handle others instead of delivering them to the mobile web server **100**.

When an existing IP address is changed due to dynamic IP-address allocation, the mobile web server **100** may deliver the changed IP address to the wired server **200** each time the IP address is changed. The mobile web server **100** may create and manage a client table, which includes a URL and an IP address of at least one web server, including the mobile web server **100**.

The mobile web server **100** may store necessary data in the wired server **200** so as to have the wired server **200** handle some of the web services of the mobile web server **100**. For example, the mobile web server **100** may store an initial screen file of the web service and contents for web service such as applications in a storage space of the wired server **200**. The contents for web service may be stored in a specific directory in the storage space of the wired server **200** to be discerned by the mobile web server **100**.

A user of the client device **300** may access the mobile web server **100** through the following exemplary process. The user of the client device **300** inputs a URL (http://christine.domain.net) of the mobile web server **100** to request a service of the mobile web server **100**, to the web browser **310** and attempts to access the mobile web server **100**.

The client device **300** obtains an IP address of the mobile web server **100** through a domain name system (DNS) server **400** in order to access the mobile web server **100** using the input URL. In this case, domains of the mobile web servers including the mobile web server **100** are registered as IPs of the wired server **200** in the DNS server **400**, which operates on the Internet. For example, an IP address of URLs (*.domain.net) of all the mobile web servers that have registered their URLs in the wired server **200**, including a URL (christine.domain.net) of the mobile web server **100**, is registered as a URL (www.domain.net) IP address (10.20.30.100) of the wired server **200**, as shown in FIG. **1**. Accordingly, the wired server **200** may receive a request for access to the mobile web server **100** in advance of the mobile web server **100**.

The wired server **200** controls access to the mobile web server **100** using the received URL. The wired server **200** may instead provide at least one of the services provided by the mobile web server **100**. Here, the contents may include contents for application provision and execution, as well as media contents such as photographs, videos, and audio files.

The wired server **200** may provide some services, such as application program interface (API) for providing static contents such as an initial screen of a homepage and documents, or schedule information, among the services provided by the mobile web server **100**, in place of the mobile web server **100**. For example, when a request for access to the mobile web server **100** is received from the web browser **310** of the client device **300**, the wired server **200** may provide an initial page (index.html) file (/var/www/users/christine/index.html) previously set by a user of the mobile web server **100** and stored in the wired server **200**, to the web browser **310**, instead of delivering the access request to the mobile web server **100**.

That is, the wired server **200** may respond to the request for service of the mobile web server **100**, managed by the wired server **200**, using service stored in a corresponding directory of the wired server **200**. For this, the wired server **200** may use a module for redirecting the request for access to the mobile web server **100** to a corresponding directory of the wired server **200**. For example, an Apache web server may use a rewrite module.

When a URL with which the mobile web server **100** is to directly provide the web service is received, the wired server **200** delivers the received URL to the mobile web server **100**. For example, when a URL (http://christine.domain.net/mo-

bile/photos/PIC0002.jpg) of contents included in the initial page file is selected by the web browser **310**, the wired server **200** determines that a URL in which a mobile directory is included in the domain of the mobile web server **100** requests the contents stored in the mobile web server **100**. Accordingly, the wired server **200** delivers the URL to the mobile web server **100**. In return, the mobile web server **100** may send the contents corresponding to the URL to the client device **300** through the wired server **200**.

When the user of the mobile web server **100** stores a photograph acquired by a camera as a file /www/photos/PIC002.jpg, a URL of this file (http://christine.domain.net/mobile/photos/PIC0002.jpg) may be produced. The user of the mobile web server **100** may report the location of the contents by transmitting the URL of the contents to other users through a channel such as short message service (SMS) or e-mail, and the other users may access the photograph stored in the mobile web server **100** through the wired server **200**, as described above. In this case, the mobile web server **100** recognizes that the wired server **200** has requested the file "PIC002.jpg", and transmits the file to the wired server **200**, and the wired server **200** responds to the request by delivering the file to the web browser **300**.

As described, the wired server **200** may handle some services, for example, static non-personalized services, instead of the mobile web server **100** handling all incoming requests and providing the corresponding services. Accordingly, efficiency of the web service and response speed to the web browser **310** may be improved. Also, since the wired server **200** may instead provide some of the services provided by the mobile web server **100**, a load to the mobile web server **100** may be reduced and fuller and more secure services may be provided to the user of the client device **300**.

Also, as the wired server **200** delivers a service request directed to the mobile web server **100**, to the mobile web server **100**, the wired server **200** may block external non-authorized service requests in advance. Accordingly, security of the mobile web server **100** may be reinforced.

Also, the user of the mobile web server **100** may transmits only a URL in his or her mobile web server without separately uploading contents created by the user, for example, a photograph taken and stored using a camera of a mobile phone, to an external server, in order to share the contents with other users who may directly access them using the URL.

FIG. **2** is a block diagram of an exemplary mobile web server **100**.

The mobile web server **100** includes a controller **110**, a user interface manager **120**, a communication unit **130**, and a storage unit **140**.

The controller **110** controls overall operation of the mobile web server **100**. The user interface manager **120** provides a user interface to allow a user of the mobile web server **100** to input data including contents for web service. The communication unit **130** controls network access. The storage unit **140** may include an operating system and a file system, and stores user-input contents for web service.

Exemplary operation of the mobile web server **100** follows.

To provide the web service using the wired server **200**, the controller **110** controls the communication unit **130** so that a URL is registered in the wired server **200** for subscription, as illustrated in FIG. **1**. When authentication is successfully performed, the controller **110** registers the IP address of the mobile web server **100** in the wired server **200**.

The controller **110** performs a login process in the wired server **200** through the communication unit **130** in an initialization process and is authenticated by the wired server **200**. Generally, the user is authenticated as a previously registered user by transmitting his or her ID and password to the server. The URL of the mobile web server **100** may be used as an ID in consideration of the fact that authentication is performed on the mobile web server **100** operated in, for example, a mobile phone, which may be a personal device of the user. A related Internet standard includes OpenID protocol. For example, since the URL of the mobile web server **100** of the user is "christine.domain.net," the wired server **200** may perform a login task using this URL as an ID.

Also, the user may initially subscribe to the wired server **200** to use the mobile web server **100**. In the subscription process, the user may be allocated the URL of the mobile web server **100** and use the URL as a user ID. Accordingly, a need for separate management of the user ID may be avoided. The URL-based ID may be used as the user ID even in other Internet services accommodating existing OpenID protocol by applying OpenID protocol, which is a conventional Internet standard.

The controller **110** may set contents that the wired server **200** can provide in place of the mobile web server **100**, for example, an initial page of a homepage and certain static contents, in response to a user input signal input from the user interface manager **120**, and control the communication unit **130** to deliver the set contents to the wired server **200**.

FIG. **3** is a block diagram of an exemplary wired server **200** to provide a mobile web service.

The wired server **200** includes a network controller **210**, an information processor **220**, a service agent **230**, and a database **240**.

The database **240** may include an operating system and a file system of the wired server **200**. The database **240** of the wired server **200** may store IP addresses of at least one mobile web server. For example, the database **240** stores IP addresses corresponding to URLs of subscribed mobile web servers, and stores contents for web service of each mobile web server stored in the wired server **200**.

Exemplary operation of the wired server **200** follows.

When a request for access to the mobile web server is received, for example, access to the mobile web server **100**, the network controller **210** controls access to the mobile web server **100** using the IP address of the mobile web server **100** retrieved from the database **240**. The request for access to at least one mobile web server may include a URL indicating a location of contents for web service provided by the at least one mobile web server.

The network controller **210** may restrict a request for access to the mobile web server **100** from a non-authorized client device by filtering a request for access to the mobile web server **100** from an authorized client device, using previously set client device identification information authorized to access the mobile web server **100**.

The service agent **230** may provide at least one static service provided by the mobile web server **100** in place of the mobile web server **100**. When the request for access to the mobile web server **100** is intended to access the service provided by the service agent **230**, the network controller **210** may control the service agent **230** to process the request.

The network controller **210** may determine whether the web service that the service agent **230** can provide in place of the mobile web server **100** is requested, using a URL indicating a location of contents for web service provided by the mobile web server **100** which is included in the request for access to the mobile web server **100**. For example, when information indicating a directory of the storage space of the mobile web server **100** is included in the URL received from the client device **300**, the network controller **210** may deliver the received URL to the mobile web server **100**.

The information processor **220** processes the information received from the network controller **210**, stores the result of processing in the database **240**, and processes information required for operation of the wired server **200**.

Prior to a service process related to the mobile web server **100**, the network controller **210** may perform an authentication task to register an IP address of a new mobile web server. When a login request from the mobile web server is received, the network controller **210** may use a URL of the mobile web server as an ID of the mobile web server in performing an authentication task in response to the login request.

FIG. **4** illustrates an exemplary method of a wired server **200** to provide a mobile web service.

The wired server **200** receives a request for access to at least one mobile web server in operation **410**. The wired server **200** controls access to the mobile web server, for example, the mobile web server **100**, using an IP address of the mobile web server **100** retrieved from a database, which stores the IP address of the at least one mobile web server, in operation **420**.

It may be determined whether a web service that the wired server **200** can provide in place of the mobile web server **100** is requested using a URL indicating a location of contents for web service provided by the mobile web server **100**, which is included in the request for access to the mobile web server **100**. When it is determined that a web service that the wired server **200** can provide in place of the mobile web server **100** is requested, the wired server **200** may provide the web service to a client device requesting the access, instead of delivering the access request to the mobile web server **100**.

FIG. **5** illustrates an exemplary method of providing a mobile web service using a wired server **200** and a mobile web server **100**.

The mobile web server **100** desiring to provide a web service using the wired server **200** registers a URL in the wired server **200** and performs a subscription procedure in the wired server **200** in operation **510**. Here, the URL may be allocated by the wired server **200**.

The wired server **200** authenticates the mobile web server **100** using the URL received from the subscribed mobile web server **100** in operation **512**. When authentication is successfully performed, the mobile web server **100** registers the IP address in the wired server **200** in operation **514**. The mobile web server **100** stores contents for web service in the wired server **200** in operation **516**.

When a client device **300** on a network desires to access the mobile web server **100**, the client device **300** delivers a URL of the mobile web server **100** to a DNS server **400** and requests an IP address of the mobile web server **100** in operation **518**. Since the IP address of the mobile web server **100** has been registered as the IP address of the wired server **200** in the DNS server **400**, the DNS server **400** delivers the IP address of the wired server **200** to the client device **300** in operation **520**.

The client device **300** transmits a request for access to the mobile web server **100** to the wired server **200** in operation **522**. In this case, when the client device **300** requests an initial screen from the mobile web server **100**, the wired server **200** may provide the initial screen of a homepage previously set by the mobile web server **100** to the client device **300** in operation **524**.

When the client device **300** selects a photograph file on the initial screen, a URL including directory information of the mobile web server **100** in which the photograph file is stored is selected on the initial screen and transmitted to the wired server **200** to request the photograph file in operation **526**. The wired server **200** may analyze the URL, and when contents directly managed by the mobile web server **100** are requested, the wired server **200** sends the URL to the mobile web server **100** to deliver the photograph file request in operation **528**.

The mobile web server **100** searches for a photograph file corresponding to the received URL and delivers it to the wired server **200** in operation **530**, and the wired server **200** delivers the photograph file to the client device **300** in operation **532**.

According to certain example(s) described above, access to a mobile web server can be delivered through a wired server to cope with a malicious attack such as a distributed denial of service (DDoS) attack and block reckless access by external users. Also, efficiency of web service provided by the mobile web server may be improved by utilizing a cache of the wired server.

According to certain example(s) described above, efficient web service may be provided using limited resources of a mobile web server while maintaining high usability in sharing contents of the mobile web server with other clients by virtue of a wired server connected to the Internet.

The methods described above may be recorded, stored, or fixed in one or more computer-readable storage media that includes program instructions to be implemented by a computer to cause a processor to execute or perform the program instructions. The media may also include, alone or in combination with the program instructions, data files, data structures, and the like. Examples of computer-readable media include magnetic media, such as hard disks, floppy disks, and magnetic tape; optical media such as CD ROM disks and DVDs; magneto-optical media, such as optical disks; and hardware devices that are specially configured to store and perform program instructions, such as read-only memory (ROM), random access memory (RAM), flash memory, and the like. Examples of program instructions include machine code, such as produced by a compiler, and files containing higher level code that may be executed by the computer using an interpreter. The described hardware devices may be configured to act as one or more software modules in order to perform the operations and methods described above, or vice versa. In addition, a computer-readable storage medium may be distributed among computer systems connected through a network and computer-readable codes or program instructions may be stored and executed in a decentralized manner.

A number of exemplary embodiments have been described above. Nevertheless, it will be understood that various modifications may be made. For example, suitable results may be achieved if the described techniques are performed in a different order and/or if components in a described system, architecture, device, or circuit are combined in a different manner and/or replaced or supplemented by other components or their equivalents. Accordingly, other implementations are within the scope of the following claims.

What is claimed is:

1. A wired server for a mobile web service, comprising:

a database configured to store an IP address of at least one mobile web server;

a network controller configured to control access to a mobile web server, in response to a request including a URL for access to a service of the mobile web server among the at least one mobile web server by redirecting the request to the mobile web server corresponding to the URL; and

a service agent configured to provide a service provided by the mobile web server in place of the mobile web server,

wherein the network controller determines whether a web service that can be provided by the service agent in place of the mobile web server is requested, based on the URL

indicating a location of content for the web service provided by the mobile web server, and

wherein in response to the request for access to the mobile web server being a request for access to the service provided by the service agent, the network controller redirects the request for access to the mobile web server to the service agent for the service agent to handle the request, and

wherein the IP address of the mobile web server is registered as an IP address of the wired server in a domain name system (DNS) server such that the wired server receives the request for access to the service of the mobile web server prior to redirecting the request to the mobile web server using the IP address of the mobile web server.

2. The wired server of claim **1**, wherein the request for access to the service of the mobile web server comprises a URL indicating a location of content for a web service provided by the mobile web server.

3. The wired server of claim **1**, wherein the network controller is configured to register a new mobile web server based on a URL of the new mobile web server.

4. The wired server of claim **3**, wherein the network controller is configured to perform a login task using the URL of the new mobile web server as an ID of the new mobile web server.

5. The wired server of claim **1**, wherein the network controller is configured to filter the request for access to the mobile web server to restrict the request for access to the mobile web server.

6. The wired server of claim **1**, wherein the DNS server generates the IP address of the wired server based on the URL of the mobile web server.

7. The wired server of claim **1**, wherein the IP address of the at least one mobile web server is different than the IP address of the wired server.

8. A method of operating a wired server to provide a mobile web service, the method comprising:

receiving a request including a URL for access to a service of a mobile web server among at least one mobile web server;

controlling access to the service of the mobile web server by redirecting the request to the mobile web server corresponding to the URL;

determining whether a web service that can be provided by the service agent in place of the mobile web server is requested, based on the URL indicating a location of content for the web service provided by the mobile web server; and

providing at least a part of the service of the mobile web server by a service agent of the wired server in place of the mobile web server,

wherein an IP address of the mobile web server is registered as an IP address of the wired server in a domain name system (DNS) server such that the wired server receives the request for access to the service of the mobile web server prior to redirecting the request to the mobile web server using the IP address of the mobile web server.

9. The method of claim **8**, wherein the request for access to the mobile web server comprises a URL indicating a location of content for web service provided by the mobile web server.

10. The method of claim **8**, further comprising: registering a new mobile web server based on a URL of the new mobile web server.

11. The method of claim **10**, further comprising:

performing a login task using a URL of the new mobile web server as an ID of the new mobile web server.

12. The method of claim **8**, further comprising: filtering the request for access to the mobile web server to restrict the request for access to the mobile web server.

13. The method of claim **8**, the DNS server generates the IP address of the wired server based on the URL of the mobile web server.

14. The method of claim **8**, wherein the IP address of the at least one mobile web server is different than the IP address of the wired server.

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